KEWA

NEWSLETTER OF THE LONDON CHAPTER,
ONTARIO ARCHAEOLOGICAL SOCIETY
c/o London Museum of Archaeology
1600 Attawandaron Road, London, ON N6G 3M6

April 2005 05-4

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The next meeting of the London Chapter will be held on Thursday, **September 8th** 2005. The speaker will be John McDonald, of the Ontario Ministry of Culture, who will speak on his work with a project trying to track down remnants of the Franklin Arctic expedition. The presentation is entitled: ***Adventures in the Arctic.*** So come on out and hear what promises to be a very informative presentation!!

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The meeting will be held at 8 pm at the London Museum of Archaeology, 1600 Attawandaron Road, near the corner of Wonderland & Fanshawe Park Road, in the northwest part of the city.

Chapter Executive

ANNUAL RATES

Student	$15.00
Individual	$18.00
Institutional	$21.00
Subscriber	$20.00

We apologize for the lateness of the "April" *Kewa* issue but we have been getting these out much more regularly than in the past thanks to a number of people who have come across with material...not that we have a surfeit of papers for *Kewa* and as always we are looking for more contributions as the cupboard is getting bare. In any case, we actually delayed producing this issue so we could include some chapter news for a change! Of course, we need to remind you that the September speaker is already finalized and several months in advance so we are actually getting ahead of ourselves there as well. John MacDonald will speak of some of his work in the Arctic on Thursday, September 8/05.

There is however much other news. We will again have a London Chapter picnic in association with the annual Archaeology Day at Longwoods Conservation area just east of London on County Rd. #2 near Delaware, Ontario (for information and directions see: www.lowerthames-conservation.on.ca/LongwoodsRoadCA.htm or contact a London OAS executive member listed on the front cover). The conservation area has an interpretative centre and an Iroquoian village reconstruction (Ska-Nah-Doht) inspired by the fact the area contains several pre-contact Iroquoian villages and hamlets. Archaeology Day is an annual event at Longwoods. Chapter members have long participated such as Chris Ellis and Jim Keron who will identify artifacts brought in by local residents and many other chapter members have often shown up. This year the event will be held on Sunday, July 17/05. The picnic will be beforehand beginning around 11:00-11:30 AM with the official Archaeology Day activities running from 1:00 PM to 4:00 PM. Members of the London Chapter OAS will be given free admission to the grounds by identifying themselves at the front kiosk and we expect to begin gathering around 11:00-11:30 AM in time for a picnic lunch before the archaeology day events. There will be a BBQ spit for cooking your lunch and Native games in which you can participate. So get your picnic lunches together and join us at Longwoods on a lazy Sunday in July.

Chris Ellis will also be continuing his fieldwork this summer at the Green Hill Preceramic (hopefully mainly Late Archaic) site near Thedford, Ontario where he has done excavations the past two years. He will be in the field June 23-24, June 27-30 and July 11-15, 2005. He invites volunteers who want to participate to contact him at the address, phone or email listed on the cover. He already has several volunteers/conscripts for June sessions so the July session is when he could use most help.

We also continue to plan for the Fall of 2006 when we will be hosting the annual meeting of the Ontario Archaeological Society, the first time we have hosted this event in many years. We have several sessions planned and of course, we have already booked the Best Western Lamplighter Inn and Conference Centre on Wellington Road South for the conference. As we get closer to the event we will most certainly need some volunteers to man the registration desks, etc. and will be putting out a call to the membership.

We also remind you to renew your memberships (or subscriptions if you are not a member of the Main OAS – please identify if you are an OAS member or not) if you have not done so already...Kewa, monthly speakers, picnic, opportunities for fieldwork experience, archaeology conferences, etc. make the London Chapter a bargain!!!

MODELLING RISK IN THE GREAT LAKES: AN ANALYSIS OF HISTORIC DATA AND SOME ARCHAEOLOGICAL EXPECTATIONS

Jim Esler

INTRODUCTION

How food is secured in the face of environmental variability is central to a society as the consequences of shortages can be drastic and have far-reaching effects on cultural behaviour and social life. The continued survival of small-scale horticultural societies with limited resources is dependent on balancing those low points in the availability of food from year to year with risk-buffering mechanisms available to the society to even out the associated shortfalls. Research on risk-buffering strategies has been conducted on contemporary horticultural societies living in arid and semi-arid tropical regions (Kirkby 1974; Wisner and Mbithi 1974; Burton *et al.* 1978). This paper investigates strategies designed to minimize the effects of fluctuations in food supply caused by environmental variability in historically-documented aboriginal populations in the Great Lakes area. Additionally, this analysis expands the information available on decision-making and risk-buffering strategies in small-scale human-energy based horticultural societies (Braun and Plog 1982; Cancian 1980; Colson 1979; Johnson 1989; Minnis 1985; O'Shea 1989; Rautman 1990). This study is an extension of the historic research on the Huron initiated by O'Shea (1981,1989).

To mitigate interannual variability in food supplies, horticultural societies may employ two basic strategies based on the number of participating communities and the level of interactions between them: simple and complex. Simple systems involve only a single cultural group whereas complex systems involve the interaction of multiple social or cultural groups. Simple systems can be further characterized on the basis of the periodicity of wild resource harvesting. In simple-regular systems, both horticultural and wild resource harvesting occurs every year. In simple-episodic systems, the harvesting of wild resources varies in intensity from year to year according to current horticultural success (O'Shea 1989:60).

In a similar manner, complex systems may be defined by the level of economic specialization of the participant groups. The main buffering strategy in complex-specialized systems is the specialized production or over-production of horticultural produce coupled with regular exchange over ecological boundaries. Participating horticultural societies would be required to produce enough of a surplus to satisfy not only their own immediate and future requirements, but also enough to exchange with the other participating communities. Complex-nonspecialized systems consist of networks of farming communities connected by the maintenance of reciprocal exchange relations. The exchange of foodstuffs need not take place on a regular basis as with complex-specialized strategies. Instead, exchange occurs when one of the participant communities experiences food shortages.

In both types of complex systems, the movement of goods and the maintenance of obligations are the factors that produce the principle buffering effect. Complex systems are potentially more effective and are capable of supporting larger populations than simple systems. However, they are inherently less flexible and afford less control to individual societies (O'Shea 1989:60).

Both simple and complex systems rely on wide range of practices that are designed to lessen the effects of environmental variability by dampening its impact. These risk-buffering strategies are mobility, diversification, storage and exchange (Minnis 1985; O'Shea 1989; Rautman 1990).

Mobility is the simplest of these responses. This response takes advantage of the patterning of resource failure by moving away from local scarcity. Resources in other areas may be obtained through the mobility of individuals or of whole groups or portions of social groups for shorter or longer periods of time. Mobility encompasses a range of options from the simple redistribution of the population to lessen the effects of local or seasonal shortages to the temporary movement of the population into an adjacent territory to the permanent abandonment of an area. The use of this strategy depends on the availability of space into which people can move, and the permanence of their facilities (Dean *et al.* 1985). The more densely a region is populated, the less viable mobility is as a strategy. The more time and energy expended in the construction of a camp or village, the less likely that its inhabitants will want to abandon it.

Diversification encompasses a wide range of practices, which broaden the base of the subsistence system by exploiting a wider range of plants and animals or by exploiting broader and more varied areas. This response also takes advantage of the local character of most resource failures in either a small area or in a particular resource class.

Coupled with high levels of production, diversification strategies are often sufficient to level out differences in food availability among households within a community. However, if a wide area is affected by severe environmental conditions then diversification may not be very effective in preventing substantial crop loss or food shortages (Minnis 1985, O'Shea 1981).

O'Shea (1989) suggests that in small-scale horticultural societies, diversification strategies will take into account the exploitation of non-domesticated secondary or fall-back resources. In poor years, these societies may resemble hunter-gatherer societies in their use of wild resources. Time and labour requirements of an horticultural system place serious constraints on the range of wild resources that might potentially be used for intensive harvesting. In order to be useful as a buffer against shortages, wild resources must meet four requirements. First, they must occur in dense patches that are suitable for intensive harvesting. Second, they must have a high potential for storage. Their interannual variability must be largely independent of that of the horticultural crops. Finally, their pattern of seasonal availability should be compatible with the horticultural cycle. O'Shea (1989) argues that fish provided such an abundant fall-back resource. Fish were a ubiquitous and important resource throughout the Great Lakes, and they satisfy the theoretical requirements described for a wild resource to counterbalance expected year to year variability in horticulture.

Storage is the primary means of levelling temporal variation. It is most effective for coping with regularly occurring periods of scarcity. It is not particularly effective in guarding against prolonged shortages (Minnis 1985; Rautman 1990). Storage of food may be either direct or indirect.

Direct, or physical, storage includes those activities that serve to keep actual foodstuffs so that they may be consumed later. This storage may be undertaken by individual households or may involve the participation of the whole community. It becomes the principal means of providing food during

seasons when fresh crops are not available. Among societies with less well-developed storage technologies, the ability to store produce directly is limited as food is a relatively perishable commodity (O'Shea 1981).

Indirect storage includes those processes that transform foodstuffs into a more stable, alternative form, from which food may later be recovered. This procedure may involve the conversion of foodstuffs into durable goods, which can be redeemed later for food, or food may be exchanged against a moral obligation of reciprocity (O'Shea 1981; Rautman 1990). Colson (1979) argues that social links outside a societies immediate region are the ultimate insurance against famine. However, the use of social relationships to acquire food during a shortage is a viable strategy only if the shortage is more localized than the social network. Common mechanisms of indirect storage include the cultivation of trading partners, the creation of fictive kinship ties and exogamy (Minnis 1985). With these contacts, not only can food be obtained, but points of refuge and relief can be found during times of food stress.

In settings where storage is regularly practiced, over-production and exchange can be effective responses to interannual variability in the food supply (O'Shea and Halstead 1989). Exchange within or between social groups can act to even out spatial or temporal variability. Within a local group, exchange minimizes differences in individual or household procurement. Beyond the local group, exchange may provide information about distant areas as well as direct access to distant resources (Rautman 1990). In this manner, exchange is similar to indirect storage in that a present surplus is converted into a future obligation in time of need.

To test the operation of the model outlined above the historic literature from the Great Lakes region will be presented, focusing on the risk-buffering strategies that were practiced.

DOCUMENTARY DATA BASE

The main source of data used in this analysis is the Jesuit Relations (Thwaites 1896-1901). These are annual reports written by the Jesuit missionaries in New France and sent back to their superiors in France. These were published in Paris to generate support for the Jesuit missions. These records cover a long period of time and include information on a number of the societies that inhabited the Great Lakes region. The Jesuit Relations have been supplemented by reports and journals of several authors. Additional visits to the Huron were made by Samuel de Champlain in the winter of 1615-1616 (Champlain 1882) and by the Recollet brother Gabriel Sagard in 1623-1624 (Sagard 1939). The League Iroquois were visited by the Dutch journalist Harmen Meyndertsz van den Bogaert in 1634-1635 (Bogaert 1988), by Johannes Megapolensis (1909), the Pastor at Fort Orange in 1644 and by Pierre-Esprit Radisson in the 1650s (Radisson 1967). Accounts of military expeditions against the League Iroquois are given by Jacques Rene de Busay, Marquis de Denonville in 1687 (O'Calloghan 1849) and by one of his soldiers, Louis Armand de Lom d'Arce, Baron de Lahontan (1905). Accounts of later campaigns are given by men of John Sullivan's expedition in 1779 (Cook 1972).

Various Algonkian societies were visited by Lahontan and Radisson as well as by the Jesuit Father Pierre-Francois-Xavier de Charlevoix in 1721 (Charlevoix 1866-1872) and by Claude C. Le Roy, Bacqueville de la Potherie (1911) and Nicholas Perrot (1911) in the late seventeenth century.

Antoine Denis Raudot, intendant of Canada from 1705 to 1710 left a series of letters in which observations were made regarding some of the Algonkian groups (Raudot 1940).

There are several limitations in the use of these data. Not all societies or geographical areas were given equal coverage. The best record in this regard is for Huronia, where the Jesuits maintained a permanent presence from 1634 to 1650. Some societies had direct European contact only for short periods of time. For example, there are only two reports from Europeans living among the Neutral: one by the Franciscan friar Joseph de la Roche Dallion in 1626-1627 (Le Clercq 1881:263-272); the second by the Jesuit priests Jean de Brebeuf and Joseph Marie Chaumonot in 1640-1641 (Thwaites 21:187-237). Data concerning some of the other societies living around the Great Lakes, such as the Erie and the Petun, are virtually absent.

Although some of these early missionaries and explorers were keen observers, as a whole the reports of the various authors vary greatly in the quality of reporting and in the types of observations made. For example, the Jesuit Fathers Lalemant and Ragueneau were most concerned with religion and the growth of the Church in New France, and most of their relations revolve around the number of new converts to the faith and the exemplary actions of some of these new Christians. In many cases, the reporting of the economic activities of the aboriginal populations is anecdotal.

Finally, the missionaries and explorers were often recording the activities of societies that had already suffered disruptions to aboriginal patterns at the time of direct European contact. For example, the Odawa are known to have occupied the Bruce Peninsula at the time that the Jesuits had missions amongst the Huron (Fox 1990). However, most of the ethnographic data regarding the Odawa comes from the time after they had removed themselves to the Lake Superior region.

COMPLEX-SPECIALIZED

The most important risk-buffering mechanisms used by complex-specialized societies were storage and exchange. A common form of this strategy is the exchange between horticultural populations and hunter-gatherers. The model would predict sedentary populations living in large villages with evidence for the over-production of horticultural produce and facilities for the storage of this surplus. Furthermore, the model predicts that regular exchange would take place with non-horticultural societies.

The Huron depended heavily on the over-production of maize to satisfy their immediate needs as well as to generate the surpluses needed for exchange and to carry them through years when the current crop failed (Sagard 1939:pf.103). Cultivation of the ground began in the spring once the snow cover had melted (Lafiteau 1977:54). Sagard indicates that two types of maize were grown, one that ripened in three months, another that ripened in four (Sagard 1939:104). The fields were constantly tended throughout the summer and the crop was harvested in the autumn (Thwaites 8:pp.87-89,143).

Both Champlain and Sagard indicate that the Huron planted an abundance of maize above that which was required for immediate consumption. After the ground was prepared for sowing, several kernels were planted together in order to ensure that a surplus of maize was generated (Champlain 1882:178;

Sagard 1939:pf.103). The amount of the surplus is not known except that both of these authors suggest that the excess maize was enough for two to four years. The Huron stored maize in bark casks located at the ends of their longhouses (Champlain 1882:161; Sagard 1939:95). After a fire had burned the village of Teandeouihata, the surviving longhouse held a feast in which two 'bins' of maize were given to the rest of the village. Each 'bin' was estimated to have held 100 to 120 bushels of maize (Thwaites 8:95).

These stores of maize were not only for the consumption of the individual villages. Local surpluses, when available, could also be made available to other areas within Huronia experiencing shortages (Thwaites 10:35), as well as to outside social groups such as Algonkian-speaking populations (Sagard 1939:pf. 110) and the Wenro (Thwaites 17:25-29). In 1649, the Jesuits were lamenting the fact that they were responsible for furnishing the Huron with maize, when in earlier times it was the Huron who supplied the French with maize (Thwaites 34:207).

The Huron would also exchange surplus maize on a regular basis with Algonkian-speaking populations to the north and east. The extent to which these Algonkian populations were dependent on this supply is unknown, but Huronia was described as being 'the granary of most of the Algonquins' (Thwaites 8:115). In exchange for maize, the Huron received deer and beaver skins as well as fish (Champlain 1882:121; Thwaites 13:249).

Fishing was an important activity in the Huron subsistence cycle. It provided a resource that was abundant and that was not directly linked to the same environmental variability that maize was. Seine fishing was carried out starting in March (Thwaites 17:197, 35:187) and fishing continued through to May (Thwaites 14:57). Champlain indicates that the most important fishing season seems to have been during the autumn and early winter (Champlain 1882:183). This season includes the spawning periods of the Atlantic salmon, trout and whitefish (Scott and Crossman 1973). These fishing expeditions were carried out by men who travelled some distance from their home villages (Thwaites 19:225; Sagard 1939:185). When the spawning period finished in December, the men returned to their villages (Thwaites 15:113; Sagard 1939:190). Fish would be dried and stored for consumption during the winter (Champlain 1882:pf.123).

Hunting appears to have played a minor part in the Huron subsistence cycle. Game animals were available only in the late autumn and early winter (Thwaites 13:109, 33:83), and meat in the Huron diet was rare and mostly reserved for feasts (Thwaites 17:pp141-143; Sagard 1939:82,105).

The Huron also employed a number of famine foods. During the famines of 1643 and 1649-1650, the Huron were reduced to a diet consisting predominantly of acorns supplemented by roots and mosses (Thwaites 27:65, 34:215, 35:93).

COMPLEX-NONSPECIALIZED

Complex-nonspecialized systems rely on the maintenance of social networks between communities that pursue essentially similar subsistence activities. These networks ensure that food resources in one locality can be made available to communities experiencing shortages (O'Shea 1989:60). The model would predict sedentary horticultural villages with evidence for the production and storage of

surplus crops coupled with exchange between similar horticultural societies. Alternatively, complex-nonspecialized systems may rely on links made for communal resource procurement activities such as hunts or fishing.

The main strategy of the League Iroquois of western New York State was their ability to produce enough of a surplus of maize that was available to other members of the League when needed. Several authors give estimates of the amount of maize that the Iroquois were able to produce. On December 13, 1634, van den Bogaert states that in one village, the Mohawk had on hand 300 to 400 'skipples' of maize. If one skipple is equivalent to 0.764 bushels, then there were some 229.2 to 305.6 bushels of maize in storage (Bogaert 1988:4). De Denonville claims to have destroyed some 1,200,000 bushels of maize both in the field and in storage in a punitive expedition against the Seneca in 1687 (O'Callaghan 1849:239), while Lahontan states that on the same expedition, five or six days were spent cutting down maize stalks (Lahontan 1905 1:130). In 1696, Frontenac took three days cutting down the fields of the Onondaga (O'Callaghan 1849:334). The estimates of how much maize Sullivan's 1779 expedition against the Seneca range from 60,000 bushels to 160,000 bushels. Commonly quoted figures from individual villages burned are 15,000 to 20,000 bushels and 150 to 200 acres (Cook 1972). During the same year, an expedition against the Cayuga claimed to have destroyed 200 acres of maize (Cook 1972:303). The various estimates of bushels and acreage must be viewed with some skepticism. The ability of any of these observers to accurately assess volumes and areas is unknown, and in the case of the military expeditions, there may be a tendency to overestimate the amount destroyed in order to increase the magnitude of victory. However, while any or all of these absolute numbers may be questionable, they all suggest that the Iroquois were able to produce a large amount of maize.

Maize appears to have been stored in communal granaries and pits (Parker 1926:71). Lafiteau (1977) describes bark storehouses in the form of towers among the Seneca, while some of the houses at the Mohawk village of Tenotoge may have served as storehouses (Bogaert 1988:9). The Mohawk stored maize in open deep pits (Megapolensis 1909:177). The distribution of food within a village was extensive (Thwaites 43:271) and survived as a buffering mechanism as late as 1796, when Belknap and Morse mention that among the Oneida, those with food were expected to provide for those without (Belknap and Morse 1955:23,30).

Exchange between villages of the various tribes that made up the League Iroquois was important. The expressed purpose of de Denonville's expedition against the Seneca was to destroy enough of their maize in order to starve them to death. It was felt that as the Seneca was the most populous nation, the rest of the League combined would not be able to supply them with enough food until the next fall without experiencing deprivations themselves (Thwaites 63:277). De Denonville thought that this strategy would be successful if the expedition against the Seneca were accompanied by an attack against the Mohawk. De Denonville wrote in 1686 that:

> It would be very desirable that I could destroy all the corn in the same year, so that the one [Mohawk] could no longer support the other [Seneca] (O'Callaghan 1849:219).

This strategy was ultimately unsuccessful, as Lahontan states that the other League Iroquois were still able to supply the Seneca with maize (Lahontan 1905 1:130).

Fishing occurred throughout the spring to autumn.The spring fisheries seem to have concentrated on species that spawn in rivers and streams, with species spawning in both lakes and rivers being caught later in the year (Megapolensis 1909:177; Thwaites 43:261; Bogaert 1988:13). Fishing parties ranged in size from 10 to 12 men (Megapolensis 1909:177) to camps of 15 cabins (Radisson 1967:9). Estimates of how productive this industry was are scarce. Van den Bogaert estimated that up to 800 salmon were caught by the Oneida in one day in December of 1634, and that he 'saw houses with 60, 70 and more dried salmon' (1988:13). Megapolensis states that shad and lampreys caught in the spring were dried and kept for winter consumption (Megapolensis 1909:177).

Hunting occurred during the autumn to early winter. Beaver was hunted during September, otters from late September through October and deer during December (Thwaites 53:251, 54:pp.117-119; Lahontan 1905 1:112).

The importance and proportion of wild foods in the diet are not discussed in the sources. Parker argues that these were collected in large quantities and included artichoke tubers, mushrooms, pond-lily roots, cattail roots, wild leek, lichens, nuts and berries (Parker 1926:71).

Although the database concerning the Neutral is small, they also appear to resemble the model definition for a complex-nonspecialized system. The Neutral were fully horticultural, growing the same crops as the Huron and seem to have enjoyed a more prosperous location for hunting (Thwaites 21:195-197; Le Clercq 1881:270). Although Sagard (1939:158) mentions that the Neutral were allied with the Odawa against the Fire Nation [Mascouten], it appears that more important relationships existed between the Neutral and their Iroquoian neighbours. During the winter of 1642-1643, approximately 100 Neutral visited the Huron (Thwaites 15:157), and in 1640, some Neutral took refuge amongst the Petun (Thwaites 20:47). The Wenro are mentioned as having been an 'associate nation' of the Neutral. When the latter withdrew from the relationship, the Wenro sought refuge amongst the Huron (Thwaites 17:pp.25-27).

There is little direct information about the Odawa when they occupied the Bruce Peninsula. Sagard indicates that while some of the Odawa planted maize, the basic subsistence strategy practiced was a hunter-gatherer economy (Sagard 1939:pf.66). More information is available about the Odawa from the mid-seventeenth century. Populations located in the vicinity of Chequamegon Bay, Wisconsin in 1665-1666 are described as living in settled villages which were based on a mixed economy of maize and fishing (Thwaites 50:273, 54:167). Odawa living around Sault Ste. Marie in 1672-1673 and on the Beaver Islands in the 1750s were also described as living in settled villages based on maize and fishing (Charlevoix 1923 2:44; Thwaites 57:pp.203-207). This emphasis on fishing was due to a general lack of game in the region (Thwaites 50:177). Around Chequamegon Bay, sturgeon was caught from spring until the autumn while whitefish, trout and herring were caught in the early winter. Estimates of the size of a single catch include 20 to 40 sturgeon, 150 whitefish or 800 herring (Thwaites 54:pp149-153). Cadillac described the fishery around Mackinac as being 'daily manna, which never fails; there is no family which does not catch sufficient fish in the course of the year for its subsistence' (Kinietz 1940:239). Surplus maize from Mackinac was reported to have been sold at

a high price (Potherie 1911:pf.281), and in 1688, Lahontan purchased maize from a mixed village of Odawa and Huron on Mackinac (Lahontan 1905 1:pf.143).

Certain of the Algonkian populations centered around Green Bay seem to have engaged in communal subsistence activities. In 1665, Claude Allouez found that while most of the population left the area around Green Bay for the winter, one village made up of Sauk, Potawatomi, Fox and Winnebago stayed together (Thwaites 54:pp.205-207). In the late seventeenth century, Bacqueville de la Potherie found another small village composed of Potawatomi, Sauk, Menominee and Wyandot who appear to have farmed land in common and held feasts for neighbouring tribes (Potherie 1911:pf.291). The Potawatomi were also able to supply maize to Mackinac when needed (Raudot 1940:381).

SIMPLE-REGULAR

According to the model definition, simple systems involve only a single cultural group. Under this definition, none of the societies inhabiting the Great Lakes region would be considered simple systems. All historically observed societies had exchange relations with other societies. However, the definition of simple systems can be modified to include an emphasis on the risk-buffering strategies of the society under consideration rather than the number of groups involved. Simple-regular systems can then be defined as including societies with small numbers of people whose risk-buffering strategy revolved around the seasonal mobility of the local group.

The majority of Algonkian-speaking populations around the Great Lakes practiced a hunter-gatherer economy. However, some tribes did grow maize while others were to some extent dependent on maize supplied by horticultural populations. The Nipissing and Ojibwa were described as nomadic peoples who lived by hunting and fishing (Thwaites 23:pp.205-207). They did not raise their own maize and did not store produce (Perrot 1911:102; Potherie 1911:280). The Jesuits found instructing them difficult, as they were out in the woods hunting in the summer (Thwaites 49:235), or had dispersed to winter quarters (Thwaites 23:227). The reason suggested for this wandering lifestyle was that these populations were:

> deprived of the convenience of having wheat by the poor quality of the soil, and the coldness of the climate and are deprived of the different animals to the south that inhabit this part of the land, finding the climate more pleasing and more temperate (Raudot 1940:pf.368).

Some of the Ojibwa living at Sault Ste. Marie were able to remain in the area throughout the year by reason of the quantity of fish they were able to catch at the rapids, while others would leave the area for the winter hunt (Thwaites 54:131; Potherie 1911:pf.276).

Several references are made to Algonkian groups who did cultivate maize, although not in great quantities (Champlain 1882:114; Perrot 1911:109). Raising a crop to maturity was not always possible. For example, some of the groups around Sault Ste. Marie planted maize, but this ripened with difficulty on account of the fogs caused by the rapid and the maize was ordinarily harvested green (Raudot 1940:pf.370). This fog sometimes prevented a crop from growing at all (Lahontan 1905 1:153).

These Algonkian-speaking groups also would trade with horticultural societies for maize. Perrot observed Iroquois trading maize for meat in the late 17th century (Perrot 1911:43), while both the Nipissing and the Ojibwa are recorded as trading fish and beaver pelts, respectively, for stores of maize (Thwaites 21:239; Radisson 1967:47). Some Nipissing groups also would overwinter with the Huron (Thwaites 33:153).

Whether these populations traded for maize or grew their own, maize appears to have simply been another resource available in an annual cycle. The majority of these populations dispersed into the interior during the winter to hunt, and returned to the shores in the spring to fish (Potherie 1911:pp.278-280; Charlevoix 1923 1:272; Raudot 1940:369).

The Algonkian-speaking tribes that inhabited the area around Green Bay in the mid- to late seventeenth century also practiced a seasonal round. However, these groups seem to have relied on horticultural produce more than those populations living north of the Lakes. The Potawatomi, Fox and Sauk are described as growing abundances of maize and other cultigens (Thwaites 51:27, 54:223, 56:125; Charlevoix 1923 2:111; Raudot 1940:381). In the winter, the men women and children would set out for winter hunting camps and would return to their villages in the spring to plant more maize (Thwaites 51:41; Potherie 1:pp.304-306). The Sauk were reported by Allouez in the 1660s as being 'wandering and scattered in the forests, without any fixed abode' (Thwaites 51:45), indicating that there was no one subsistence strategy for these tribes. The Fox are observed to have subsisted on maize stored in the villages from the previous years, indicating that these locations were visited year after year (Thwaites 54:223, 60:pp.199-201). Sturgeon were caught during the spring and summer (Thwaites 54:pp.215-217), while in the autumn, both fish and migratory waterfowl were abundant. When horticulture, hunting and fishing all failed, acorns and beechnuts were used as famine foods (Thwaites 54:203, 56:131-133).

SIMPLE-EPISODIC

For simple-episodic systems the model would predict small horticultural villages which would disperse into smaller groups to exploit wild resources on an *ad hoc* basis, depending on the amount of horticultural produce harvested in any given year. None of the societies in the region of the Great Lakes seems to fit this aspect of the model.

The model of risk-buffering strategies was tested with historically documented examples of societies from the Great Lakes. The discussion of the particular strategies employed by the various societies can be used to model settlement patterns for archaeological populations in the same region.

ARCHAEOLOGICAL EXPECTATIONS

In simple-regular systems, both horticultural products and wild foods are exploited in an annual economic cycle based on seasonal movement. The high mobility required to make this a viable strategy would keep population numbers low. The expected settlement pattern would be one of base camps located near seasonally available resources including summer horticultural camps, with smaller field camps devoted to the procurement and processing of specific resources, located a few days' journey away. Because of limitations in the modelling of the environment, these sites will

appear to have a random distribution across the landscape. Horticultural base camps will be located on land that has high Canada Land Inventory ratings for corn production, and will exhibit evidence of spring to fall occupations. Non-horticultural base camps will be located on land that has lower ratings for corn production. Field camps displaying evidence for specific resource procurement are also expected.

In simple-episodic systems, the exploitation of wild resources depends on current horticultural success. In the good years when the cultivated crop comes in, the population would be able to occupy small villages on a year-round basis. These villages will be located on land with high ratings for corn agriculture. In bad years, the inhabitants of these settlements would disperse into smaller exploitive camps similar to those found in simple-regular systems.

As noted above, complex-specialized systems rely on the production or overproduction of crops. Such a strategy is designed to make the best out of the good years. This increased production of crops would support larger local populations than simple-regular or simple-episodic systems. The expected settlement pattern is a series of sites with redundant horticultural functions. Larger villages would be located on the best land for agriculture given the current technology available. Seasonally-occupied horticultural hamlets would be located on other productive lands in order to even out the risk of crop failure.

Regular exchange over ecological borders is another part of this system. With few bulk transport capabilities available to North American aboriginal societies, the amount and distance that these goods could travel was limited. In order for the exchange of foodstuffs over these borders to be effective, complex-specialized systems would need to be located near the borders of diverse ecological zones. Additionally, it is possible that settlements of trading partners from these ecological zones may be found in the host territory. One example of this would be Algonkian populations overwintering in Huronia. The exploitation of seasonally available foods as insurance against low yields would still be practiced. With larger populations to feed, extensive fishing and hunting hamlets would be expected.

Complex-nonspecialized systems would be found in areas that experience fewer bad years. The expected settlement pattern would consist of a network of semi-permanent horticultural villages located on the best agricultural land, but the lower production of cultigens involved limits the usefulness of intense horticultural production that would involve horticultural hamlets. Instead, a series of field houses, occupied on a temporary *ad hoc* basis and devoted to the maintenance of fields, would be expected. These field houses will be found on a variety of soils with a range of agricultural potential, including soils that are not the highest rated in terms of productivity in the area. As exchange is carried out with societies having similar subsistence strategies, the presence of spatially distant complex-nonspecialized societies is needed to make this a viable strategy.

The assessment of risk management discussed here not only helps our understanding of the distribution of sites across the landscape, but may also augment our comprehension of the early historic sources for the Great Lakes area. These documentary sources still provide invaluable, but often overlooked, resources for the generation and testing of hypotheses.

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